INTRODUCTION
Extra Co established in Sharjah, U.A.E. in 1981, is a leading manufacturer in fibreglass industry. Much knowledge has been accumulated during the past two decades, resulting from extensive research and product testing and providing more definitive information on product performance. Durability and performance are the main requirements for Municipal and Industrial projects across the region. The GRP products and services provided by Extra Co meet these requirements by providing long-term performance solutions to the highest international standards.
Extra Co’s commitment to Quality and Customer-satisfaction has always ensured successful completion of projects by providing a combination of reliable products and services.

MISSION, VISION & VALUES
Extra Co’s blue elephant logo, although symbolic of the first Extra Co product - the water tank - embodies the core missions and values being promoted internally as well as to customers: The first is ‘Strength’, and it is reflective of our staff's technical capabilities as well as our high-quality engineered products. The second is ‘Efficiency’ and it is indicative of Extra Co’s mode of operation which allows lot of flexibility in delivery time, design, and cost vis-a-vis clients. The third is ‘Friendliness’ and it is a value Extra Co prides itself on given the long-term relationships with both clients and suppliers.
Our mission is to provide our customers with the best value-engineered products and trunkey solutions for their industrial and construction needs within the quality standards, delivery time-frame, and investment budget constraints. Extra Co achieves the above by implementing and maintaining an effective quality management system which conforms to ISO 9001:2008 and API SPEC Q1 8th edition.
In addition, assessments to Extra Co’s products have been carried out by international bodies and, multiple accreditations have been obtained from BVQI, API and WRAS.
Glass Reinforced Plastics “GRP” or Reinforced Thermosetting Resin ‘RTR’ pipes exhibit excellent adhesion, fatigue-resistance, impact strength, chemical-resistance and low shrinkage, leading to lesser stresses in the finished pipe, superior mechanical and chemical properties, long-term performance and excellent fatigue-resistance under cyclic loading.

Different types of resins are used, leading to the following categories:

- **GRP** Using Isophthalic Resin in structural wall and Vinylester Resin in liner (where applicable). For both underground and aboveground applications, restrained and non-restrained systems, in media temperature upto 60°C.
- **GRV** Using Vinylester Resin throughout. For industrial application where specific chemical resistance is required. Used mainly in aboveground applications in media temperature upto 85°C.
- **GRE** Using Epoxy Resin throughout. For industrial application in media temperature upto 120°C. Additional external protection can be applied to allow for additional fire-retardance.

### Applications

- Condenser water
- Chilled water
- Chemical and petrochemical industry
- Duct for odour control
- Duct for HVAC
- Effluent water
- Fire mains
- Food industries (refineries and breweries)
- Irrigation Line
- Manhole liners
- NDM
- Power plants
- Pumping stations
- Sanitary sewers
- Storm water & Drainage systems
- Sewer force mains
- Sleeves for road crossing
- Structural manholes
- Thrust boring
- Valve chambers
- Water transmission
- Water desalination plants

### Applicable Standards

<table>
<thead>
<tr>
<th>Standard</th>
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</thead>
<tbody>
<tr>
<td>ASTM D 2517</td>
<td>BS EN 1796</td>
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<tr>
<td>ASTM D 3262</td>
<td>BS EN 14364</td>
</tr>
<tr>
<td>ASTM D 3517</td>
<td>AWWA C-950</td>
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<tr>
<td>ASTM D 3754</td>
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</tbody>
</table>

Extra Co GRP/GRV/GRE pipes are manufactured on CNC filament winding machine by continuous & discontinuous filament winding process monitored by a fully computerized system. The inner liner thickness of pipes is approximately 0.5mm to 1.5mm, Reinforced with ‘C’ glass veil and can be of higher thickness as required. The structural wall consists of glass rovings impregnated with Resin wound at precisely set helical winding patterns under uniform tension for the various designs. The outer finish consists of Resin topcoat. (UV stabilized paraffinated resin rich flow coat for aboveground pipe).

### Manufacturing

GRP/GRV/GRE fittings required for various applications are provided by Extra Co. using same material as pipe, formed to suit pipe size and end design, in required elbows, tees, unequal tees, concentric and eccentric reducers, flanges, blind flanges, puddle flanges, couplings, saddles, wyes, crosses, end caps, etc. Special fittings can be made available upon request. **We are specialized in making spools as per site requirement.**
JOINTING SYSTEM OF PIPES AND FITTINGS

Restrained (Tensile Resistant) | Non-restrained
---|---
- Flanged Joint | - Bell and spigot
- Butt and wrap joint | - Double bell coupling
- Rubber seal locked joint | - Adhesive joint (straight or tapered)

FLANGED JOINT
To enable connections with steel and to allow for easy assembling and disassembling of process lines, Extra Co pipes and fittings can be supplied with flanges, drilled in accordance with ANSI, BS, DIN or other standards. Special requirements can be met upon request.

LAMINATION JOINT
In general these joints will be used from diameters 80mm. The preparation of this rigid joint requires good craftsmanship.

RUBBER SEAL LOCK JOINT
This type of joint consists of an integral filament wound socket end and a machined spigot end. The O-ring seal is positioned on the spigot end. The locking devise is inserted through an opening in the socketed end. If fits in a circumferential groove on the inner side of the socketed end and rests against a shoulder on the spigot end. Extra Co rubber seal lock joint allows for some axial movement as well as a certain angular deflection.

ADHESIVE JOINT
Pipes are produced with integral socket and spigot ends. Ends are slightly tapered or straight. The inside of the socket matches with the outside of the machined spigot. The two-component of adhesive, namely, base and hardner are supplied in appropriately sized cans in correct mixing ratio.

BELL AND SPIGOT JOINT
The socket end of this joint is an integral filament wound part of the pipe. The spigot end is a machined part on which O-ring seal is positioned. The flexible joint allows for axial movement of the spigot in the socket and some permissible angular deflection.

DOUBLE BELL COUPLING
Short pipes are joined using double bell coupling. The sealing of the joint is achieved by the compression of two elastomeric rubber gaskets when the joint is assembled.

NB: Joint gaskets and joint rings should be suitable for use in the prevailing climate, soil, ground water, or other media conditions. Rubbers generally used are - Natural rubber, Nitrile rubber SBR or EPDM rubber. For detailed procedure on above joint please contact technical department.
**PRODUCT INFORMATION AND APPLICATION**

1. Series : EX 100 - OIL FIELD INDUSTRY
   - Pressure up to 32 bars
   - Diameter 50-300mm
   - Aboveground & underground application
   - GRE pipes

2. Series : EX 200 - CHEMICAL AND PETRO-CHEMICAL INDUSTRY
   - Pressure up to 16 bars
   - Diameter 50-1200mm
   - Aboveground application
   - GRV pipes / GRE Pipes

3. Series : EX 300 - WATER SUPPLY
   - Pressure up to 16 bars
   - Diameter 50-2000mm
   - Mainly underground application
   - GRP pipes

4. Series : EX 400 - FIRE PROTECTION SYSTEM
   - Pressure up to 32 bars
   - Diameter 50-300mm up to 32 bars
   - Diameter 400-600mm up to 25 bars
   - GRE pipes

5. Series : EX 500 - SEWERAGE / DRAINAGE
   - Gravity and pressure up to 12 bars
   - Diameter 50-2000mm
   - 1.0-2.0mm thick Vinylester Resin liner
   - Structural wall Isophthalic
   - GRP pipes

6. Series : EX 600 - POWER STATIONS AND DESALINATION PLANTS
   - Pressure up to 16 bars
   - Diameter 50-1200mm
   - Special design for full vacuum and rigid coupling

7. Series : EX 700 - DRAINAGE, IRRIGATION AND STORMWATER APPLICATION
   - Pressure up to 12 bars
   - Diameter 50 - 2600mm
   - Special design for full vacuum and rigid coupling
   - GRV pipes / GRP pipes

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**PIPE STIFFNESS**

<table>
<thead>
<tr>
<th>Pressure Class (Bar)</th>
<th>1250 N/m²</th>
<th>1500 N/m²</th>
<th>2500 N/m²</th>
<th>5000 N/m²</th>
<th>10000 N/m²</th>
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<tbody>
<tr>
<td>6</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<td>16</td>
<td>✓</td>
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<td>25</td>
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<tr>
<td>32</td>
<td>✓</td>
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</table>

**NB**: Other stiffness designs can be made available upon request.

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**AVAILABLE STANDARD EXTRA CO SYSTEMS**

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**NB**: Other pressure systems can be made available upon request. Diameters greater than 2600mm are also available.
Extra Co GRP/GRV/GRE pipes and fittings are subject to quality control testing/inspection and thorough checks as per inspection test plan. All incoming raw materials and finished products are inspected and tested in accordance with international standards such as ASTM/DIN/BSI in line with inspection test plan.

Following are in-house tests carried out on EXTRA Co GRP/GRV/GRE pipes and fittings.

<table>
<thead>
<tr>
<th>S.No.</th>
<th>TYPE OF TEST</th>
<th>STANDARD FOR TEST METHOD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Wall thickness</td>
<td>ASTM D 3517 / 3567 ; BS EN 1796 / 14364</td>
</tr>
<tr>
<td>2.</td>
<td>Visual inspection</td>
<td>ASTM D 3517 / 2563 ; BS EN 1796 / 14364</td>
</tr>
<tr>
<td>3.</td>
<td>Dimensional checks</td>
<td>ASTM D 3754/3262/3517/2517 ; BS EN 1796/14364</td>
</tr>
<tr>
<td>4.</td>
<td>Hydrostatic pressure test</td>
<td>ASTM D 3754 / 3262 / 2517 ; BS 5480</td>
</tr>
<tr>
<td>5.</td>
<td>Barcol hardness</td>
<td>ASTM D 2583 ; BS 2782</td>
</tr>
<tr>
<td>6.</td>
<td>Constituent by weight % (LOI)</td>
<td>ASTM D 2584 ; BS 2782</td>
</tr>
<tr>
<td>7.</td>
<td>Stiffness test</td>
<td>ASTM D 2412 ; BS EN 1796 / 14364</td>
</tr>
<tr>
<td>8.</td>
<td>Split disk test (circumferential tensile strength)</td>
<td>ASTM D 2290 ; BS EN 1796 / 14364</td>
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<tr>
<td>9.</td>
<td>Tensile strength (axial tensile strength)</td>
<td>ASTM D 638 ; BS EN 1796 / 14364 / 2782</td>
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<td>10.</td>
<td>Flexural strength</td>
<td>ASTM D 790 ; BS EN 1796 / 14364 / 2782</td>
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<tr>
<td>11.</td>
<td>Compressive strength</td>
<td>ASTM D 695 ; BS EN 1796 / 14364 / 2782</td>
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<td>12.</td>
<td>Short beam strength</td>
<td>ASTM D 2344</td>
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<td>13.</td>
<td>Beam strength test</td>
<td>ASTM D 3517 ; BS EN 1796 / 14364</td>
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<td>14.</td>
<td>Hydrostatic design basis for pipes and fittings (static)</td>
<td>ASTM D 2992 ; BS EN 1796 / 14364</td>
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<td>15.</td>
<td>Strain corrosion test</td>
<td>ASTM D 3681 ; BS EN 1796 / 14364</td>
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<td>16.</td>
<td>Short-time hydraulic failure pressure of pipes</td>
<td>ASTM D 1599 ; BS EN 1796 / 14364</td>
</tr>
<tr>
<td>17.</td>
<td>Water absorption</td>
<td>ASTM D 570 ; BS 3532 / BS 2782</td>
</tr>
</tbody>
</table>

Typical Mechanical and Physical Properties of Extra Co GRP/GRV/GRE Pipes and Fittings.

<table>
<thead>
<tr>
<th>PROPERTIES</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific gravity</td>
<td>1580 - 1850 kg/m³</td>
</tr>
<tr>
<td>Hoop tensile strength</td>
<td>210 - 490 N/mm²</td>
</tr>
<tr>
<td>Axial tensile strength</td>
<td>40 - 80 N/mm²</td>
</tr>
<tr>
<td>Coefficient of thermal expansion</td>
<td>18 to 30 x 10^-6 (mm/mm°C)</td>
</tr>
<tr>
<td>Flexural modulus</td>
<td>13800 - 20000 N/mm²</td>
</tr>
<tr>
<td>Compressive strength</td>
<td>208 - 364 N/mm²</td>
</tr>
<tr>
<td>Stiffness</td>
<td>1250 - 15000 N/m²</td>
</tr>
<tr>
<td>Barcol hardness</td>
<td>30 - 50</td>
</tr>
<tr>
<td>Hoop modulus of elasticity</td>
<td>10000 - 30000 N/mm²</td>
</tr>
<tr>
<td>Axial modulus of elasticity</td>
<td>6000 - 15000 N/mm²</td>
</tr>
<tr>
<td>Thermal conductivity</td>
<td>0.2 - 0.35</td>
</tr>
<tr>
<td>Specific heat</td>
<td>921 J/kg.K</td>
</tr>
<tr>
<td>Poisson ratio (axial/hoop)</td>
<td>0.45 to 0.65</td>
</tr>
<tr>
<td>Poisson ratio (hoop/axial)</td>
<td>0.15 to 0.38</td>
</tr>
<tr>
<td>Glass content for pipe (by mass)</td>
<td>65 to 70 %</td>
</tr>
</tbody>
</table>
The exterior surface of Extra Co pipes and fittings shall be free of the following irregularities.

**PROPERTY** | **DEFINITION**
--- | ---
Fuzz | Glass fibres loosely adhering to the pipe and not wet out with resin.
Protruding fibres | Glass fibres sticking out from faces that are wet out with resin.
Resin runs | Runs of resin and sand on surface of pipe.
Dry area | Area in laminate with glass not wet out with resin.
Hand lay up ragged areas | Rough area at the edge of hand lay up.

**MARKING PIPES AND FITTINGS**
Pipes and fittings are clearly marked at Extra Co factory with the following information.

1. Distinctive mark of manufacture
2. Date of manufacture
3. Class or pressure rating
4. Inner diameter
5. Manufacturing standard
6. Stiffness (N/m²)
7. Employer name / project / contract
8. Angle of bends and branches

**DELIVERY, STORAGE AND HANDLING**
Should be in accordance with Extra Co recommendations. Please refer to Extra Co Storage, Handling and Installation Instructions.

**INSTALLATION**
Extra Co Installation specifications have been developed to ensure proper performance according to the design requirements.

- **Buried Installation**
  The customer shall ensure to the minimum that buried pipes are installed in accordance with Extra Co “Guidance for underground installation of fibreglass pipe”

- **Aboveground Installation**
  A complete engineering design is needed to ensure proper performance. The customer shall ensure to the minimum that aboveground pipes are installed in accordance with Extra Co “Guidance for aboveground installation of fibreglass pipe”. The same is provided by highly qualified consulting houses in the following activities:

- Flexibility analysis
- Hydraulic calculations
- Surge analysis
- Dynamic analysis, vibration prediction and control of piping
- Support design
- Isometric drawings
- Design of GRP/GRV/GRE Systems
- Spool drawing on client layout

“EXTRA CO PIPES AND FITTINGS QUALITY AND RELIABLE SYSTEMS FOR A GUARANTEED PERFORMANCE”